TECHNICAL NOTES

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A Spruce Budworm Risk-Rating for the Spruce-Fir Types in the Lake States

One of the most important phases of spruce budworm control through cutting practices is the logging of high risk stands in advance of a possible epidemic. Stands with high concentrations of mature and over-mature balsam fir, or those containing a high proportion of poor vigor trees, are more susceptible to budworm injury and are believed less able to recover after several years of heavy defoliation. White spruce is less susceptible to budworm damage than balsam fir, while black spruce is seldom severely damaged. Now that a spruce budworm epidemic is threatening the Lake States, a risk-rating is needed to determine which stands are in greatest danger of damage.

Because balsam fir in the Lake States usually occurs in small blocks, 40 acres or less, and is found occasionally with black spruce on uplands, stand conditions are different from those in spruce-fir types of the Northeast and Canada, and require a different approach to a risk classification. The risk-ratings developed for the Lake States (tables on back of sheet) rely heavily on research conducted in the Northeast and Canada, but are based on data obtained so far in Minnesota. Future research in this region may result in a modification of the tables. In the meantime, the procedures can be employed to advantage until more accurate information is obtained through additional timber management studies.

The factors of risk considered in the Lake States risk-rating are age,1/ density (expressed as volume per acre of balsam fir and white spruce only), composition (proportion of balsam fir in the stand), area, and vigor.2/ The data describing the stand can be made accurate if ground surveys are used. For rough estimations of risk, photo-classification can be employed.

For example, assume a 40-acre stand where age of balsam fir at breast height is 70 years; density per acre of white spruce and balsam fir only is 6 cords, with balsam fir composing 60 percent of that density; and vigor is medium. In table 1, age 70 and density of 6 cords give a value of 50. In table 2, this value of 50, with only 60 percent balsam fir, is reduced to 40. A stand of 40 acres with trees of medium vigor, according to table 3, will finally rate a value of 45. This risk value of 45 places the stand on the high side of the medium risk category (table 4). Interpolation to the nearest 5 units can be used if desired.

The risk-rating, plus careful evaluation of economic considerations placed on that stand by the forest manager or owner, will determine the priority and time of cutting or the feasibility of control.

1/ In two-storied stands the weighted average age of two levels should be used if the lower story is 40 years or older.

2/ The tables used in this note were developed with the aid of S. R. Gevorkiantz.

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MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA

Table 1.--Consider age and density of spruce-fir type

Age of balsam fir stand (years)	Volume per acre in cords (white spruce-balsam fir only) 1/						
	Less than 2	2	4	6	8	10	20
Less than 35	0	0	0	0	0	0	0
35	0	0	0	0	5	5	10
40	0	0	5	10	15	25	40
50	0	5	15	25	35	40	55
60	0	10	20	40	50	55	65
70	0	15	25	50	60	65	70
80	0	15	25	55	65	70	75

1/ In trees 5.0 inches d.b.h. and larger. Volume per acre is considered as a factor of risk.

Table 2.--Consider proportion of balsam fir in the stand

Table 1 value	Ratio of balsam fir to white spruce					
	0:100	20:80	40:60	60:40	80:20	100:0
0	0	0	0	0	0	0
5	0	0	0	5	5	10
10	0	5	5	10	10	10
15	5	5	10	10	15	15
20	5	10	10	15	20	20
25	5	10	15	20	20	25
30	10	15	20	20	25	30
35	10	15	20	25	30	35
40	10	20	25	30	35	40
50	15	25	35	40	45	50
60	15	30	40	50	55	60
70	20	30	40	55	60	70
80	20	35	50	60	70	80

Table 3.--Consider area and vigor of stand 1/

Table 2 value	Area in acres																	
	2			5			10			20			40			100		
	Good	Medium	Poor	Good	Medium	Poor	Good	Medium	Poor	Good	Medium	Poor	Good	Medium	Poor	Good	Medium	Poor
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	5	5	5	5	5	5	5	5	5	10	10	15	10	10	15
10	5	5	5	5	5	5	10	10	15	10	10	15	10	15	20	10	15	20
15	10	10	15	10	10	15	10	15	20	10	15	20	15	20	25	15	20	25
20	10	10	15	10	15	20	15	20	25	15	20	25	20	25	30	25	30	35
25	10	15	20	10	15	20	15	20	25	20	25	30	25	30	35	30	35	40
30	10	15	20	15	20	25	20	25	30	25	30	35	30	35	40	30	40	50
35	15	20	25	20	25	30	25	30	35	30	35	40	35	40	50	35	45	55
40	15	20	25	25	30	35	30	35	40	35	40	50	35	45	55	40	50	60
50	20	25	30	30	35	40	35	45	55	40	50	60	45	55	65	50	60	70
60	25	30	35	35	40	50	40	50	60	50	60	70	50	65	80	55	70	85
70	30	35	40	40	50	60	50	60	70	55	70	85	60	75	90	65	80	95
80	35	40	50	50	60	70	55	70	85	65	80	95	70	85	100	70	90	100

1/ Area is considered as a factor of risk. Use acreage as is if isolated patches are involved, or use combined acreage of all separate patches which occur within 1/4 mile radius.

Table 4.--Priority classification 1/

Table 3 value	Spruce budworm risk
0 - 10	No risk
15 - 25	Low risk
30 - 45	Medium risk
50 - 70	High risk
75+	Very high risk

1/ In addition to risk the operability, accessibility and other economic factors should be considered in determining priority.